Exemption No. 6506

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056

In the matter of the petition of

Bombardier Inc., Canadair

for an exemption from § 25.562 of the Federal Aviation Regulations

Regulatory Docket No. 28543

DENIAL OF EXEMPTION

By letter WBR-20209 dated April 2, 1996, W. B. Remington, Chief Airworthiness Engineer, Bombardier Inc. Canadair, P.O. Box 6087, Station Centre-ville, Montreal, Quebec H3C 3G9, Canada, petitioned for an exemption from the emergency landing dynamic conditions of § 25.562 of the Federal Aviation Regulations (FAR), for the Model BD-700-1A10 airplane. The manufacturer refers to the Model BD-700-1A10 for sales purposes as the Global Express.

Section of the FAR affected:

Section 25.562 requires that each seat type design approved for crew or passenger occupancy during takeoff and landing must successfully complete dynamic tests. The tests must be conducted with an occupant simulated by a 170-pound anthropomorphic test dummy. The seat and supporting structure must not fail during the test. Also, injury criteria are provided that must not be exceeded during the test.

Related Section of the FAR:

Section 25.785(b) requires that each seat, berth, safety belt, harness, and adjacent part of the airplane at each station designated as occupiable during takeoff and landing must be designed so that a person making proper use of those facilities will not suffer serious injury in an emergency landing as a result of the inertia forces specified in §§ 25.561 and 25.562.

ANM-96-019-E
The petitioner's supportive information is as follows:

"With a Certification Basis established in the late 1980s, the Regional Jet was one of the first types to be `required' to comply with JAR 25.562. Our technical and logistic experience with this activity leads us to conclude that compliance with 25-64 has been and will continue to be a significant burden. As you are aware, we continually face difficulties in cost control and lead times for customer requested new/modified passenger cabin designs due to compliance with this standard. It is particularly relevant where the RJ competes with aircraft types that can offer cheaper and potentially more flexible cabin interiors as a result of not having to comply with this standard. On the same basis, competitors can usually offer shorter design/development times.

"Technically, 25.562 has been an enormous challenge. Whilst the RJ cabin size does not give rise to `flexibility/option' restrictions that larger widebodies face with this requirement, its smallness presents a different kind of problem. Seat pitch, seat height & thickness and general seat dimensions are critical in conceiving a comfortable yet functional cabin environment. Compliance with 16g and HIC criteria has compromised these features: 16g seats are heavier, larger and more expensive and involve associated changes, some of which have compliance issues of their own (for example, a reduction in underseat space for carry-on baggage).

"As you may be aware, the majority of 16g compliance is achieved through TSO qualification of the seat. Our observations of this standard are similar to those of seat manufacturers, whereby the compliance effort now required for the TSO C127 has increased one and possibly more orders of magnitude compared to the previous standards. In addition, compliance results are not always consistent and the tests themselves are complicated, time-consuming and expensive to set-up.

"HIC criteria introduces even more compromise than the 16g component and has the most effect on cabin layout. It also increases seat cost, weight and dimensions and causes adverse associated modifications to placards, meal tray design/location, safety card holder and potentially seat-to-bulkhead distance. As can be seen from the current RJ exemption to the JARs, we have not yet defined a solution to seat-to-bulkhead HIC without resorting to more drastic options (full shoulder harnesses, prohibiting use of bulkhead facing seat rows for take-off and landing and-or increasing seat-to-bulkhead distances beyond the head strike radius)."

"*The Exemption requested*

"Although the subject regulation is more germane to the furnished passenger cabin, which for the Global Express is planned to be approved by Supplemental Type

Approval/Certification procedures, Canadair [is] requesting this exemption for the complete aircraft, even though the Canadair application for Type Certification is for a 'green' design. Hence, as there were no specific criteria in the FAR on this subject prior to Amendment 25-64, the exemption, if granted, would remove FAR 25.562 from the GX US Type Certification Basis."

"*Rationale supporting the Exemption*

"Our rationale for exemption is based on both technical and economic grounds."

"From a technical point-of-view, the situation is straightforward. There is no clear and obvious solution to solving compliance problems with this regulation without significantly compromising the passenger carrying capability of the product or drastically redefining what a business/executive aircraft interior is all about. Whilst this may sound more like an economic argument, we believe full compliance with FAR 25.562 is yet to be achieved for a typical business aircraft interior. We have recently been party to several presentations from industry (airframe and equipment manufacturers), where it has been clearly demonstrated that there are no easy and universally accepted technical solutions available.

"This situation is most relevant to the sideways facing seat, or divan. Even the Airworthiness Agencies have recognized that to enable each place of a three or four seat divan to be occupied for take-off and landing, compliance with FAR 25.562 is impossible. And yet, our customers continually request these seating arrangements - knowing full well the consequences of an otherwise survivable incident. Furthermore we believe FAA will not accept that the occupant forward of the place under consideration (in a sideways facing seat) can be used as the 'cushion' when complying with the injury criteria of 25.562(c) - a statement which we entirely concur with, but which says one of two things: Either FAA [is] trying to eliminate sideways facing seats, or the regulation was conceived without these seats in mind.

"Another typical executive interior configuration is also in jeopardy. The 'club-four' arrangement is usually separated by a table which may or may not be stowable for take-off and landing. If not, we believe there is no design on the market that prescribes a table material which can withstand the rigors of use, though soft enough or frangible in such a way that compliance with HIC can be achieved. If the table was made to be stowable, there would then be two options. Firstly, if stowed in a fold and/or sliding way into the local fuselage, the table size in all three dimensions would have to accommodate the receiving space. With fuselage diameters, such as the GX, this would significantly restrict the size of the table, due to fuselage curvature and structural frame spacing. Secondly, if stowing requires the table to be removed completely & secured in a different location, further problems will be faced.

"Apart from being inconvenient and most likely cumbersome to manage, there could be significant negative safety aspects on stowing a removable table. In an aircraft the size of the GX the table could have substantial mass and would need a well designed restraint system. Presumably in the passenger cabin, frequent use means more wear and tear on the restraint mechanism with the risk that it will be secured incorrectly, or not at all! This could result in an undesirable mass loose in the cabin, with the potential for injury in a scenario where the rule in question is trying to reduce such hazards. Extrapolating this situation further, with the table removed, the forward facing person(s) may face the risk of the rearward facing persons knees being in the leg and head strike radius. Such an unfortunate 'configuration' doubles the injury potential (if in place, of course, the table would protect the rearward facing person from the forward facing one).

"Our economic arguments are directly derived from the above technical position. If compliance is mandated and no appropriate design solution(s) exists, then the options available require more radical measures. The first example is the simplest and most obvious: prohibit occupation of a seat for take-off and landing where compliance has not been demonstrated. For a typical, less than 19 passenger/executive layout, up to 50% of the installed seats may immediately not be available.

"This would also be the result if all seats used for take-off and landing were rearward facing. As you are aware, rear facing seats have their own negative implications to occupant injury and are not necessarily the ideal solution.

"Another drastic approach to compliance could be the use of full shoulder harnesses for forward facing occupants. Even though this concept has not been fully explored for the business passenger (as compared to the crewmember), the burden of such a device in its use and knock on design repercussions of installation/attachment are likely to alarm potential customers. We believe this feature alone would force such customers to simply choose a design which does <u>not require</u> the occupants to wear full harnesses. Thus, in a market where the customer has a choice, the product required to comply with Amendment 25-64 would compare unfavorably with one which is not so required.

"This unfair competition is the essence of the economic premise. In the business of attracting customers to otherwise similar aircraft, the ability to offer flexibility in cabin layout, the use of high-end equipment and materials plus a comparative cost and schedule associated with the design, will make all the difference. If any one of these facets are lost, then so are the customers. At this time, mandatory compliance with Amendment 25-64 could lose all three.

"The direct cost burden of compliance with Amendment 25-64 has been debated at length and was raised again at the recent FAA briefings in Seattle, October 23rd/24th, 1995. Thus, we do not believe that any cost figures are required to support this exemption request, presuming there is extensive evidence on file with the Agencies as to the actual cost impact. In the referenced Seattle meeting as in the past, the regulatory cost/benefit analysis has come under fire. The point made by industry that FAA, in particular, underestimated the cost impact of Amendment 25-64 is most pertinent to business aircraft. Whilst it is true that wide-body commercial transport aircraft have large seat numbers and offer many passenger cabin configurations, each business aircraft interior is unique by nature and thus exposed to high nonrecurring certification costs with almost every new interior. As current compliance methodology with 25.562 requires extensive testing for each new seat, seat pitch, seat-to-seat and seat-to-structure relationship, a comprehensive test program is therefore required for every interior. Even though there are means to extrapolate some test results from similar designs, the inevitable cost and schedule burden makes this chronic task unreasonable.

"Of course such comparisons are only valid when competing aircraft have Certification Bases which differ with respect to Amendment 25-64. Such is the case between the Bombardier Global Express and the Gulfstream GV. With the recent FAA draft Policy on the subject regulation stating that "...significant derivatives .... such as the GV ... " do not need to comply with some or all aspects of 25.562, it either enables our only competitor to offer and deliver a more attractive cabin design, or obliges Bombardier to rapidly develop, design and certify compliant interiors - at a much higher cost per interior lb. weight and inherent risk to delivery schedule. We also believe this aspect of the draft Policy was retained in its published form, TAD-96-002, dated February 16th, 1996. This, Bombardier/Canadair believes, is reason enough to grant the exemption.

"*<u>Why is an Exemption in the Public Interest ?</u>*

"Whilst it would be ill advised to compare the overall safety levels of the GX with the GV, the choice facing potential customers for both aircraft would be subject to their personal cost/benefit analysis. In our opinion, this fact may place the business aircraft customer in the same situation as many large commercial aircraft operators - whether to buy older, less compliant aircraft, or more recent designs which offer a higher level of compliance.

"We do not believe that Airworthiness Standards are intended to deter customers/operators from purchasing new aircraft. However, with Amendment 25-64, the customer will be forced into choosing between the cost and safety benefit of compliance with this Standard - a choice which we have no doubt will prejudice the GX.

"Hence, granting the requested exemption would begin to even the playing field between our new aircraft and the derivative competition. It would give the marketplace a fair choice, so that customers may decide between these products based on other, perhaps more pertinent, features."

A summary of the petitioner's April 2, 1996, petition was published in the Federal Register on April 23, 1996 (61 FR 17949). Only one commenter responded. The commenter opposed the request for U.S. certification of the Model BD-700-1A10 airplane without being required to meet the dynamic seat test requirements of § 25.562.

The FAA's analysis/summary is as follows:

The petitioner has requested exemption from the requirement to show compliance with the provisions of § 25.562, which require that each seat approved for crew or passenger occupancy during takeoff and landing must be designed to withstand dynamic test conditions. The regulatory requirement to perform dynamic tests on the seat and restraint system was promulgated by Amendment 25-64, which became effective June 16, 1988. All airplanes having Amendment 25-64 as their certification basis must meet this requirement.

The petitioner bases its justification for the exemption primarily on the assertion of significant technical and economic burdens that Amendment 25-64 places on the airframe manufacturer regarding the installation of seats. The petitioner also claims that its airplane would be at a competitive disadvantage when compared to other aircraft types not having to comply with this standard. However, all newly certificated airplanes, for which application for type certification was made on or after May 17, 1988, have been required to comply with the provisions of this amendment.

The applicant further states that the rule has not gained broad acceptance by industry, few new or derivative airplanes projects launched since 1988 have been required to comply with § 25.562, most regulatory agencies have recognized the shortcomings in the Amendment 25-64, and revisions to § 25.562 are forthcoming.
While two of these arguments may have some merit, none of the reasons listed justify issuance of an exemption. Although the dynamic seat test regulation was unpopular with the industry during its promulgation, it has since gained acceptance by many seat and airframe designers. The FAA acknowledges, however, that certain test requirements specified in Amendment 25-64 present a design challenge for certain seating configurations. For instance, the front row seat HIC and the lateral restraint for side facing seats present a challenge for the seat designers. These are areas of safety concerns and do not represent a shortcoming in the regulation.

All new certification projects initiated since 1988 have been required to show compliance with most of the provisions of § 25.562. Partial exemptions have been granted for the head injury criteria (HIC) in front row seats and for the floor warpage requirement for crew seats on airplanes having a minimum of 40 inches of frangible structure between the flightcrew floor and the lower contour of the fuselage. The FAA has also granted exemption from the HIC on executive type airplanes where shoulder straps were installed on all seats.

The FAA has reviewed the arguments presented by the petitioner in support of the exemption and concludes that the data does not support its request. The argument that compliance with the rule would put the petitioner at an economic disadvantage is not supported by any factual evidence.

In consideration of the foregoing, I find that a grant of exemption is not in the public interest. Therefore, pursuant to the authority contained in 49 USC 40113 and 44701, delegated to me by the Administrator (14 CFR 11.53), the petition of Bombardier Inc. for exemption from the requirements of § 25.562 of the FAR, for the Model BD-700-1A10 airplane, is hereby denied. However, the FAA would look favorably on a request for an exemption from the front row HIC and the cockpit floor warpage requirements, provided the Model BD-700-1A10 has 40 inches of frangible structure below the pilot seats. The applicant may choose to request a partial exemption from Amendment 25-64 for these requirements.

Issued in Renton, Washington, on September 9, 1996.

/s/ James V. Devany, Acting Manager
Transport Airplane Directorate
Aircraft Certification Service, ANM-100